

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. R5-2004-0027

NPDES NO. CA0083861

WASTE DISCHARGE REQUIREMENTS
FOR
AEROJET-GENERAL CORPORATION
INTERIM GROUNDWATER EXTRACTION AND TREATMENT SYSTEMS
AMERICAN RIVER STUDY AREA, GET E/F, AND OU-3
SACRAMENTO COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Regional Board) finds that:

1. Aerojet-General Corporation (Aerojet or Discharger) submitted a Report of Waste Discharge, dated 24 June 2003 and supplemental information dated 27 August and 12 September 2003, and applied for a revision of its authorization to discharge waste under the National Pollutant Discharge Elimination System (NPDES) from the American River Study Area (ARSA) Groundwater Extraction and Treatment System and Groundwater Extraction and Treatment System (GET) E/F. The application requested authorization to add new discharges from three proposed treatment systems in the Western Groundwater Operable Unit (OU-3).
2. Aerojet operates a rocket-testing and chemical manufacturing facility in eastern Sacramento County near Rancho Cordova and Folsom. See Attachment A, a part of this order. Past discharge practices have caused the release of contaminants into the vadose zone and groundwater at the facility.
3. Concentrations of contaminants in the groundwater northwest of Aerojet's property in the vicinity of Sailor Bar Park and the Nimbus Fish Hatchery, north and south of the American River and west of Hazel Avenue (ARSA), respectively, include up to 4000 micrograms per liter ($\mu\text{g/L}$) trichloroethylene (MCL of 5 $\mu\text{g/L}$), 220 $\mu\text{g/L}$ cis-1,2-dichloroethylene (MCL of 6.0 $\mu\text{g/L}$), 110 $\mu\text{g/L}$ 1,1-dichloroethylene (MCL of 5.0 $\mu\text{g/L}$), and 36 $\mu\text{g/L}$ tetrachloroethylene (MCL of 5 $\mu\text{g/L}$). Concentrations of trichloroethylene in the plume of contaminated groundwater have been detected north of Sailor Bar Park exceeding 100 $\mu\text{g/L}$. This plume of contaminated groundwater is extracted and treated by the ARSA facility. Aerojet has been extracting and treating groundwater in the ARSA, and discharging the treated groundwater pursuant to an NPDES permit, since 1996.
4. The GET E/F facility intercepts chemicals migrating in groundwater at the western boundary of Aerojet's property. Those chemicals include trichloroethylene (TCE), perchlorate, n-nitrosodimethylamine (NDMA), chloroform, cis-1,2-dichloroethylene (1,2-DCE), 1,1-dichloroethylene (1,1-DCE), and tetrachloroethylene (PCE) at concentrations exceeding drinking water standards and/or acceptable health risk concentrations. Portions of the GET E/F facilities began operation in 1982 with discharge to ground. In 2002 the Regional Board adopted an NPDES permit allowing the discharge to surface waters.

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5. In 2002, the United States Environmental Protection Agency (USEPA) issued Aerojet a Unilateral Administrative Order (UAO) directing the Discharger to contain the plume of pollutants emanating from its property and extending off-site in an area designated as OU-3. The Regional Board issued a companion Cleanup and Abatement Order (No. R5-2002-0723) to the UAO. The remedy designed by Aerojet calls for construction of three interim extraction and treatment systems in OU-3 with discharge of the treated groundwater to tributaries to the American River. The three main chemicals of concern in OU-3 are TCE, perchlorate, and NDMA. The ARSA, GET E/F, and OU-3 systems are described more fully in separate sections that follow.

AMERICAN RIVER STUDY AREA

6. A plume of contaminated groundwater off Aerojet's property and to the north of the American River creates or threatens to create a condition of pollution or nuisance. In response, the Regional Board's Executive Officer issued Cleanup and Abatement Order No. 95-715 requiring Aerojet to submit a plan designed to minimize the flux of contaminated groundwater past the northern boundary of Sailor Bar Park while an evaluation and construction of a system for containment, extraction, and treatment of the entire plume in the American River Study Area was being made.

To comply with the Cleanup and Abatement Order, Aerojet submitted a plan proposing to initially extract approximately 500 gpm of groundwater from three existing groundwater extraction wells, treat the water using granular activated carbon (GAC), and discharge the treated groundwater under a permit into the Sacramento Regional County Sanitation District's collection system. However, the costs for discharge to the sewer were significant prompting Aerojet to request to discharge the treated groundwater under an NPDES permit to an existing pond in Sailor Bar Park. The pond was being fed by storm and urban runoff from a small upstream watershed and by a groundwater supply well near the pond. The Regional Board adopted an NPDES permit, Order No. 96-066, for the discharge from the interim treatment plant to the pond in Sailor Bar Park. Water quality of the discharge was no worse, and was generally better due to treatment, than the other discharges into the pond. Overflow from the pond is to an unnamed tributary to the American River. Given the very coarse soils in the drainage channel, the numerous road crossings blocking flow, and ponding areas, a direct discharge from the pond did not reach the American River. See Attachment B, a part of this Order.

7. The interim groundwater treatment system consisted of twenty-four GAC absorber vessels each containing 2000 pounds of carbon and operated in twelve sets of two vessels in series. The plant was designed to treat 500 gpm of extracted ground water to concentrations below that which can be detected. Prior to entering the GAC vessels, the water was passed through bag filters to remove suspended particles larger than 5 microns. The discharge was in substantial compliance with the effluent and receiving water limitations found in Order No. 96-066 during its period of operation, which ceased in October 1997 to allow construction of the current system. This new system treats extracted groundwater from all the extraction wells in the ARSA (discussed further below). Order

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No. 98-113 revised the requirements of Order No. 96-066 to reflect the new treatment plant with discharge to Buffalo Creek.

8. The Regional Board modified Order No. 95-715 with the adoption of Cleanup and Abatement Order No. 96-230 on 20 September 1996. Order No. 96-230 directs Aerojet to complete design, construction, and operation of a groundwater extraction system in the ARSA to contain and cleanup the plume of contaminated groundwater. Aerojet complied with that Order by completing construction of a treatment facility on the Discharger's property capable of treating 3500 gpm. Flow from nine extraction wells in Sailor Bar Park is pumped under the American River, combined with flows from six extraction wells on the south side of the river, and piped back to the treatment facility. The new facility came on-line in April 1998 and discharged pursuant to the NPDES permit contained in Order No. 98-113.

The treatment plant utilizes ultraviolet/peroxide oxidation and air stripping to remove the volatile organic contaminants (VOCs), as described in Finding No. 3, above.

9. Sacramento County Department of Parks and Recreation requested Aerojet to continue the discharge of groundwater to Sailor Bar Park pond (in Section 17, R6E, T9N, MDB&M). The continuous discharge of freshwater to the pond from the interim system enhanced the quality of the pond. If the current park well was utilized to provide the flow for the pond, a treatment system would be required for the well since samples of water from the well have found up to 170 mg/L trichloroethylene (TCE). A treatment system consisting of activated carbon canisters has been provided for removal of the TCE prior to discharge to the pond. The treatment system has proven effective in removing the TCE to non-detectable levels during its entire operational period. This Order requires monitoring of the water supply well treatment system. The 250 gpm flow from the water supply well is intermittent, and has a maximum flow of 0.18 million gallons per day (mgd).
10. The current discharge from the ARSA system consists of the main flow from the groundwater treatment plant to Buffalo Creek on Aerojet's property and the flow to the pond as described in Finding No. 9, above. Buffalo Creek discharges to the Lower American River just upstream of the Sunrise Bridge crossing in Section 13, R6E, T9N, MDB&M. See Attachment B, a part of this Order.
11. The Report of Waste Discharge for the ARSA facility, including data from sampling of the Sailor Bar park system and nearby groundwater wells, describes the discharge as follows:

Monthly Average Flow:	5.0 mgd
Daily Peak Flow:	5.4 mgd
Design Flow:	5.4 mgd
Average Temperature:	70°F summer; 59°F winter

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pH	7.2 - 8.5
<u>Constituent</u>	<u>mg/L</u>
COD	<3
Total Suspended Solids	<6
Chlorides	40
Sulfate	12
Manganese	0.07
Aluminum	<0.16
Zinc	0.034
Arsenic	<0.002
Lead	<0.005
Hardness (as CaCO ₃)	110
Barium	0.07
Copper	<0.0015
Chromium	<0.002
Nickel	<0.005
All Volatile Organic Contaminants	<0.0005
Perchlorate	0.008

12. Sampling for perchlorate in groundwater monitor wells in the ARSA was conducted in 1997. Concentrations ranged from non-detect (<0.004 mg/L) to 0.150 mg/L. The average concentration was 0.007 mg/L with a median of non-detect (<0.004 mg/L). The highest concentrations of perchlorate are found in the monitor wells closest to Aerojet and all wells with detections, except one, were found on the south side of the American River. Using values from monitor wells closest to the extraction wells, it is calculated that the influent to the treatment system is estimated to be around 0.007 mg/L. This is near the current Department of Health Services (DHS) Action Level for drinking water of 0.004 mg/L (January 2002) and the draft California Public Health Goal of 0.002 to 0.006 mg/L (Office of Environmental Health Hazard Assessment, March 2002). Sampling of the effluent from the ARSA facility since 1998 has shown that the concentration of perchlorate is in the range of 0.005-0.008 mg/L. It should be noted that there is a minimum 30-fold dilution in the American River (flow at 250 cubic feet per second) at the maximum discharge rate of 3450 gpm, resulting in no detectable concentrations of perchlorate in the American River. The added expense of treatment to remove perchlorate is not justified for the ARSA facility.
13. Other than those discussed above, one other contaminant of concern that was deemed necessary for evaluation is 1,4-dioxane. This contaminant is found in some of the groundwater monitor wells south of the American River in the ARSA, with a maximum concentration of 0.029 mg/l. Estimated worst-case effluent concentrations for 1,4-dioxane are 0.003 mg/L. The UV/peroxide

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treatment system provides effective treatment for the reduction of 1,4-dioxane. For 1,4-dioxane, the California State Action Level is 0.003 mg/L and the Proposition 65 value is 0.015 mg/L. The effluent limitation is set at the Action Level.

14. Another contaminant of concern is N-Nitrosodimethylamine (NDMA), which has been found in groundwater on the eastern side of Aerojet and a few wells on the western edge of Aerojet. There are no known source areas for NDMA in the vicinity or upgradient of the ARSA. In addition, NDMA has not been detected in monitor wells in the ARSA. This Order requires monitoring for NDMA in the treatment facility and in the American River upstream and downstream of the confluence with Buffalo Creek.
15. Aerojet submitted a Final Revised Engineering Evaluation and Cost Analysis (EE/CA) for the American River Study Area dated 13 September 1996, a draft Quality Assurance Project Plan dated 31 January 1998, a draft revised Sampling and Analysis Plan dated 31 January 1998, and a draft Groundwater Extraction and Treatment System Effectiveness Evaluation Work Plan dated 31 January 1998. These documents were utilized in formulating the initial Order(s).
16. The Final Revised EE/CA for the ARSA evaluated several discharge options for the treated groundwater, including providing the water for municipal and industrial use. The method of discharge covered in this permit is an interim solution, and the Discharger may in the future discharge to Buffalo Creek, Alder Creek or the Nimbus Stilling Basin, depending on the County's evaluation of the discharge alternatives in accordance with the agreement between Aerojet and the County. Prior to discharge to Alder Creek or the Nimbus Stilling Basin (See Attachment B), a thermal study will need to be completed and approval granted by the Executive Officer. See Provision E.3.

GET E/F

17. Operation of the GET E and F treatment facilities has been subject to the requirements of the Partial Consent Decree since its entry by federal district court in December 1989. Groundwater extracted from the separate GET E and GET F areas was combined in 2000 and is treated at a modified combined GET E/F treatment facility. The GET E/F extraction system is intended as an interim remedial measure to intercept groundwater pollution plumes prior to the plumes moving beyond the western boundary of the Aerojet's property. Currently, the GET E/F treatment facility extracts and treats approximately 5300 gpm, with a treatment capacity of 6000 gpm. See Attachment C, a part of this Order
18. The final remedy for OU-3 selected in the Record of Decision (ROD) issued by USEPA in July 2001 includes the GET E/F facility and requires discharge of treated groundwater to surface water. In addition there is currently no infrastructure that will allow for subsequent reuse of the treated groundwater as a replacement water supply for that lost due to the pollution in groundwater caused

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by Aerojet in the Rancho Cordova and surrounding areas. In the previous version of this Order, the Discharger was required to evaluate and make appropriate recommendations for reuse alternatives.

The Discharger, in coordination with Regional Board staff, USEPA, DHS, the Sacramento County Water Forum, The Boeing Company, and selected water purveyors, evaluated alternatives to discharge of the treated groundwater other than to surface water. A final version of a report on the evaluations was submitted on 12 September 2003. The recommended alternatives for reuse of the groundwater included environmental uses and municipal supply. In a 27 August 2003 agreement between Aerojet and the County of Sacramento, the County has agreed to develop the reuse of the treated groundwater being discharged under this Order. The reuse will include, but is not limited to, replacement of existing and future lost water supplies and providing supplies for new development in the Rancho Cordova area. The County is in the process of preparing environmental documents describing a project for reuse of the treated groundwater pursuant to the California Environmental Quality Act (CEQA) for public review. It was estimated in the Reuse Plan that the water could be available for the reuses planned by Spring 2009.

19. Aerojet discharges the groundwater treated by the GET E/F facilities to the ground for infiltration or to Buffalo Creek, tributary to the American River. Until it is feasible for the GET E/F treated groundwater to be reused, discharge to the American River for a limited duration is a reasonable use of the treated groundwater on an interim basis since it implements the goals of cleaning up the aquifer, restoring its beneficial uses, and preventing additional public supply wells from being polluted as other alternatives are considered.
20. The Basin Plan includes a Wastewater Reuse Policy that encourages the reclamation and reuse of wastewater, including treated groundwater resulting from a cleanup action, where practicable. Those reuse options include municipal and industrial supply, crop irrigation, groundwater recharge, and wetland restoration. At this time, demonstrated cost-effective options that provides for reuse of the treated groundwater have been identified in Aerojet's Reuse Plan, but will likely not be implemented until Spring 2009. The County is currently developing a project for reuse of the treated groundwater that will proceed through the CEQA process.
21. The remediation project has a potential effect on the sustainable yield of the groundwater basin from which the GET E/F extraction field takes its water. The Discharger, in accordance with requirements of the previous version of this Order, evaluated the sustainable yield of the aquifer in a report dated 12 September 2003. That report stated that there would be an additional drawdown in the eastern part of Sacramento County in the vicinity of OU-3 of up to 30 feet. Implementation of the reuse alternatives contained in the Reuse Plan will help substantially mitigate the impact of the withdrawal of groundwater for remediation purposes. The required evaluations allowed the Regional Board to determine whether there are additional environmental impacts of the Discharger's pumping and will encourage the reuse of treated groundwater consistent with the Wastewater Reuse Policy set forth in the Basin Plan.

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22. The groundwater contaminant plumes intercepted by the GET E/F extraction field include VOCs (primarily TCE), perchlorate, and NDMA.
23. The GET E/F facility uses biological reduction to remove perchlorate, ultraviolet light to destroy NDMA, and air stripping to remove VOCs. The GET E/F facility has been in operating in its current configuration since 2000. The treatment process has been shown to be effective in removing VOCs to below detection levels (0.5 µg/L), perchlorate to below 4 µg/L, and NDMA to below detection (0.002 –0.0075 µg/L). Testing of the influent and effluent to the treatment facility for full-scan analysis, including tentatively identified compound analysis, did not indicate additional contaminants of concern.
24. Initial discharge of the treated groundwater will be to Buffalo Creek. Later, the effluent from the GET E/F facility may also be discharged to Alder Creek, tributary to Lake Natoma (American River), on Aerojet's property or to the Nimbus Stilling Basin. As required in Provision E.3, below, discharge to Alder Creek and/or the Nimbus Stilling Basin will be allowed only after completion and submittal of a thermal study and approval by the Executive Officer. These three discharge locations are shown on Attachment A. A pipeline to convey the treated water from the GET E/F facility will need to be constructed prior to the discharge to Alder Creek or the Nimbus Stilling Basin. The County will evaluate whether it is preferable for implementation of reuse options to discharge the water to Alder Creek or the Nimbus Stilling Basin. The interim discharge to Buffalo Creek will co-mingle with the discharge from the ARSA facility, prior to leaving the Discharger's property.
25. The Report of Waste Discharge for the GET E/F, describes the discharge as follows:

Monthly Average Flow:	7.6 mgd
Daily Peak Flow:	7.6 mgd
Design Flow:	8.64 mgd
Average Temperature:	64°F summer; 60°F winter
pH	7.2 - 7.5

<u>Constituent</u>	<u>mg/l</u>
COD	<3
Total Suspended Solids	<5
Nitrate	<0.05
Chlorides	6.6
Sulfate	15
Manganese	0.07
Aluminum	<0.05
<u>Constituent</u>	<u>mg/l</u>

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Zinc	<0.10
Arsenic	<0.002
Lead	<0.10
Hardness (as CaCO ₃)	110
Barium	0.1
Copper	<0.01
Chromium	<0.01
All Volatile Organic Contaminants	<0.0005
NDMA	<0.000002
Perchlorate	<0.004

26. In the process of removing perchlorate, alcohol is added to the water to provide a sufficient food source for biological growth. Excess alcohol is minimized, however, the low concentrations of excess alcohol react with the peroxide used in the NDMA destruction process and low concentrations of acetaldehyde and formaldehyde are formed. Concentrations of those two chemicals have been detected in the effluent from the air-stripper at concentrations up to 2 µg/L for acetaldehyde and 50µg/L formaldehyde. Those concentrations are below the lowest adverse risk levels found of 380 µg/L (IRIS) and 100 µg/L (State of California Action Level). Effluent limitations are set at 5 for acetaldehyde and 50 µg/L for formaldehyde. In addition, it is also believed that those chemicals will be further reduced during transit to the discharge point and in the upper stretches of Buffalo Creek. Sampling conducted so far to verify this hypothesis has not detected those two chemicals at the discharge to the American River.

OU-3 Off- Site

27. To implement a remedy to contain and cleanup polluted groundwater in OU-3 off of Aerojet's property, Aerojet has proposed three interim groundwater extraction and treatment systems for Areas 1, 2, and 3 as shown in Attachments D, E, and F, parts of this Order. Over a one to two year period the interim systems will be converted to long-term treatment systems as additional extraction wells are added. Additional extraction and treatment systems may be added at a later date as recently discovered plumes are defined and cleanup is required. This Order will be reopened, as necessary, to include additional treatment systems, daily and monthly flow limitations, and/or discharge points.
28. Initial estimates for flows that will be produced by the three extraction and treatment systems are 1,500 gpm, 3,100 gpm, and 400 gpm for Areas 1, 2, and 3, respectively. The discharge flow from the Area 1 GET will be initially discharged to the storm drainage system that leads to Morrison Creek. Once the long-term GET for Area 1 is completed, the flow will be to the storm drainage system leading to the American River. The Area 2 GET will discharge to the Buffalo Creek drainage system. The Area 3 GET will discharge to the storm drain system leading to the American

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River. See Attachments D, E, and F. In the future, discharge from all three of these GETs may be discharged to the Lower American River, Buffalo Creek, Alder Creek or the Nimbus Stilling basin, depending on the County's evaluation of the discharge alternatives in accordance with the 27 August 2003 agreement between Aerojet and the County. Prior to changing the discharge location, a thermal study will need to be completed and approval granted by the Executive Officer. See Provision E.3.

29. The treatment systems will consist of GAC and/or UV-oxidation to remove TCE and other VOCs, UV destruction for NDMA, and ion exchange and/or biological reduction for perchlorate. These treatment processes have been demonstrated to remove the pollutants to below specified effluent limitations.
30. The Report of Waste Discharge for the GETs for the Western OU-3 describes the discharges as follows:

Monthly Average Flow:	7.2 mgd
Daily Peak Flow:	7.2 mgd
Design Flow:	7.2 mgd
Average Temperature:	64°F summer; 59°F winter
pH	7.2 - 7.5

<u>Constituent</u>	<u>mg/l</u>
COD	<3
Total Suspended Solids	<5
Nitrate	<0.05
Chlorides	4.0
Sulfate	7.3
Manganese	0.02
Aluminum	<0.05
Zinc	<0.10
Arsenic	<0.002
Lead	<0.01
Hardness (as CaCO ₃)	110
Barium	0.1
Copper	<0.01
Chromium	<0.01
All Volatile Organic Contaminants	<0.0005
Perchlorate	<0.004
NDMA	<0.000002

Other

31. USEPA adopted the *National Toxics Rule* on 5 February 1993 and the *California Toxics Rule* on 18 May 2000. These Rules contain water quality standards applicable to this discharge. The State Water Resources Control Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (known as the State Implementation Plan), which contains guidance on implementation of the *National Toxics Rule* and the *California Toxics Rule*.
32. The Regional Board adopted the *Water Quality Control Plan, Fourth Edition, for the Sacramento and San Joaquin River Basins* (hereafter Basin Plan). The Basin Plan designates beneficial uses, establishes water quality objectives, and contains implementation programs and policies to achieve water quality objectives for all waters of the Basin. These requirements implement the Basin Plan.
33. The Basin Plan adopted by the Regional Board includes a Wastewater Reuse Policy encourages the reclamation and reuse of wastewater, including treated groundwater resulting from a cleanup action, where practicable. Those reuse options include municipal and industrial supply, crop irrigation, groundwater recharge, and wetland restoration. At this time demonstrated cost-effective options that proved for reuse of the treated groundwater have been identified in Aerojet's Reuse Plan. Sacramento County will be developing a project to reuse the treated groundwater within the county as stated above in Finding Nos. 16 and 18.
34. Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numeric water quality standard. Based on information submitted as part of the application and from past monitoring, the Board finds that the proposed discharge has a reasonable potential to exceed standards and objectives for the constituents discussed in the Information Sheet for the following constituents:
 - a. VOCs: cis-1,2-dichloroethene, cis-1,2-dichloroethane, 1,1-dichloroethylene, chloroform, trichloroethene, and trans-1,2-dichloroethene; and effluent limitations for the constituents have been included in this Order. The two treatment systems have been designed, constructed, and have shown capable of meeting the effluent limitations.
 - b. Non-VOCs: 1,4-dioxane, formaldehyde, acetaldehyde, perchlorate, and n-nitrosodimethylamine; and effluent limitations for the constituents have been included in this Order.
 - c. This Order and the Basin Plan prohibit the discharge of toxic constituents in toxic amounts. Based on information submitted as part of the application and monitoring reports, VOCs: 1,2-dichloroethane, chloroform, cis-1,2-dichloroethene, trichloroethene, and trans-1,2-dichloroethene in the discharge, have a reasonable potential to cause or contribute to a violation

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of the Basin Plan narrative prohibition of the discharge of toxic substances in toxic concentrations. The Water Quality Standards: Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California; Rule (California Toxics Rule) is promulgated in the Federal Register, 40CFR Part 131, Part III. Effluent limitations for VOCs: 1,2-dichloroethane, chloroform, cis-1,2-dichloroethene, trichloroethene, and trans-1,2-dichloroethene, based on the California Toxics Rule and Best Available Technology (as described above), are included in this Order.

35. Federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numerical water quality objective. This Order contains provisions that:
 - a. require the Discharger to provide information as to whether the levels of priority pollutants, including CTR and NTR constituents, and constituents for which drinking water maximum contaminant levels (MCL) are prescribed in the California Code of Regulations, and temperature in the discharge cause or contribute to an in-stream excursion above a water quality objective;
 - b. if the discharge has a reasonable potential to cause or contribute to an in-stream excursion above a water quality objective, require the Discharger to submit information necessary to calculate effluent limitations for those constituents; and
 - c. allow the Board to reopen this Order and include effluent limitations for those constituents.
36. The USEPA and the Regional Board have classified this discharge as a major discharge.
37. The beneficial uses of the Lower American River downstream of the discharge are municipal and domestic, industrial, and agricultural supply; water contact and non-contact recreation; groundwater recharge, fresh water replenishment; and preservation and enhancement of fish, wildlife and other aquatic resources.
38. The beneficial uses of the underlying groundwater are municipal and domestic, industrial, and agricultural supply.
39. The permitted discharge is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Resources Control Board Resolution 68-16. Compliance with these requirements will result in the use of best practicable treatment or control of the discharge. The impact on water quality will be insignificant.

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40. Effluent limitations, and toxic and pretreatment effluent standards established pursuant to Sections 301, 302, 304, and 307 of the Clean Water Act (CWA) and amendments thereto are applicable to the discharge.
41. The action to adopt an NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21100, et seq.), in accordance with Section 13389 of the California Water Code.
42. The Department of Toxic Substances Control has certified a final Negative Declaration and Initial Study for the ARSA project in accordance with the CEQA (Public Resources Code Section 21000, et seq.), and the State CEQA Guidelines. The Board has reviewed the Negative Declaration and these waste discharge requirements will mitigate or avoid any significant impacts on water quality due to the discharges from the ARSA treatment system.
43. The Regional Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for this discharge and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.
44. The Regional Board, in a public meeting, heard and considered all comments pertaining to the discharge.
45. This Order shall serve as an NPDES permit pursuant to Section 402 of the CWA, and amendments thereto, and shall take effect upon the date of hearing, provided EPA has no objections.

IT IS HEREBY ORDERED that Order No. R5-2002-0128 is rescinded and Aerojet-General Corporation, its agents, successors and assigns, in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Clean Water Act and regulations and guidelines adopted thereunder, shall comply with the following:

A. Discharge Prohibitions:

1. Discharge of treated wastewater at a location or in a manner different from that described in Finding Nos. 9, 10, 16, 19, 24 and 28 is prohibited.
2. The by-pass or overflow of wastes to surface waters is prohibited, except as allowed by the attached Standard Provisions and Reporting Requirements A.13.
3. Neither the discharge nor its treatment shall create a nuisance as defined in Section 13050 of the California Water Code.

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4. The discharge shall not cause the degradation of any water supply.

B. Effluent Limitations:

1. Effluent from the ARSA facility shall not exceed the following limits:

<u>Constituents</u>	<u>Units</u>	<u>Daily Maximum</u>	<u>Monthly Average</u>
Total Copper	µg/L	17	11
Total Lead	µg/L	15	2.5
Total Zinc	µg/L	110	100
Volatile Organics ¹	µg/L	0.5 ¹	
1,2-Dichloroethane ²	µg/L	0.5	0.38
Perchlorate	µg/L	18	10
1,4-dioxane ³	µg/L	10	3

¹ All volatile organic constituents listed in EPA Methods 8010 and 8020. The concentration of each constituent shall not exceed 0.5 µg/L.

² If approved Practical Quantitation Level is greater than Monthly Average Limit, then compliance is met if concentration is not above the Practical Quantitation Level.

³ If approved Practical Quantitation Level is greater than 3 µg/L, then compliance is met if concentration is not above the Practical Quantitation Level.

2. Effluent from the GET E/F and western OU-3 GET (Areas 1, 2, and 3) facilities shall not exceed the following limits:

<u>Constituents</u>	<u>Units</u>	<u>Daily Maximum</u>	<u>Monthly Average</u>
Total Copper	µg/L	17	11
Total Lead	µg/L	15	2.5
Total Zinc	µg/L	110	100
Volatile Organics ¹	µg/L	0.5 ¹	
1,2-Dichloroethane	µg/L	0.5	0.38
Perchlorate	µg/L	8	4
1,4-dioxane ^{2,3}	µg/L	10	3
N-nitrosodimethylamine ²	µg/L	0.005	0.002
Acetaldehyde ⁴	µg/L	5	
Formaldehyde ⁴	µg/L	50	

¹ Volatile organic constituents listed in EPA Methods 8010 and 8020. The concentration of each constituent shall not exceed 0.5 µg/l.

² If approved Practical Quantitation Level is greater than Monthly Average Limit, then compliance is met if concentration is not above the Practical Quantitation Level.

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³ Applies to GET E/F only.

⁴ GET E/F and OU-3 facilities if biological treatment is used for perchlorate removal.

3. The discharges shall not have a pH less than 6.5 nor greater than 8.5.
4. The 30-day average daily discharge flow shall not exceed 5.04 mgd for the ARSA facility, 8.64 mgd for the GET E/F facility, 2.16 mgd for the Area 1 GET facility, 4.46 mgd for the Area 2 GET facility, and 0.58 mgd for the Area 3 GET facility.
5. Survival of aquatic organism in 96-hour bioassays of undiluted waste shall be no less than:

Minimum for any one bioassay - - - - - 70%

Median for any three or more consecutive bioassays - - - 90%

C. Sludge Disposal:

1. Collected screenings, sludges, and other solids removed from liquid wastes shall be disposed of in a manner that is consistent with Chapter 15, Division 3, Title 23, of the CCR and approved by the Executive Officer.
2. Any proposed change in sludge use or disposal practice shall be reported to the Executive Officer and EPA Regional Administrator at least **90 days** in advance of the change.

D. Receiving Water Limitations:

Receiving Water Limitations are site-specific interpretations of water quality objectives from applicable water quality control plans. As such they are a required part of this permit. However, a receiving water condition not in conformance with the limitation is not necessarily a violation of this Order. The Board may require an investigation to determine the cause and culpability prior to asserting that a violation has occurred.

The discharge shall not cause the following in the receiving water:

1. Concentrations of dissolved oxygen to fall below 7.0 mg/L.
2. Oils, greases, waxes, or other materials to form a visible film or coating on the water surface or on the stream bottom.
3. Oils, greases, waxes, floating material (liquids, solids, foams, and scums) or suspended material to create a nuisance or adversely affect beneficial uses.

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4. Aesthetically undesirable discoloration.
5. Fungi, slimes, or other objectionable growths.
6. Turbidity to increase more than 20 percent over background levels.
7. The normal ambient pH to fall below 6.5, exceed 8.5.
8. Deposition of material that causes nuisance or adversely affects beneficial uses.
9. The normal ambient temperature to be increased more than 5°F.
10. Taste or odor-producing substances to impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin or to cause nuisance or adversely affect beneficial uses.
11. Radionuclides to be present in concentrations that exceed maximum contaminant levels specified in the California Code of Regulations, Title 22; that harm human, plant, animal or aquatic life; or that result in the accumulation of radionuclides in the food web to an extent that presents a hazard to human, plant, animal, or aquatic life.
12. Aquatic communities and populations, including vertebrate, invertebrate, and plant species, to be degraded.
13. Toxic pollutants to be present in the water column, sediments, or biota in concentrations that adversely affect beneficial uses; that produce detrimental response in human, plant, animal, or aquatic life; or that bioaccumulate in aquatic resources at levels which are harmful to human health.
14. Violation of any applicable water quality standard for receiving waters adopted by the Board or the State Water Resources Control Board pursuant to the CWA and regulations adopted thereunder.

E. Provisions:

1. The Effluent Limitations for metals found in Effluent Limitations B.1 and B.2 were conservatively developed with a minimal amount of data. The Dischargers shall be collecting additional information during required monitoring that will be used to evaluate the limits. If necessary, this permit may be reopened and the effluent limitations for metals revised based on the new data.

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2. The Discharger shall comply with the Operation, Maintenance, and Monitoring Plan, Ground Water Extraction and Treatment System, American River Study Area dated **31 January 1998**, and the Operation and Maintenance Plan for GET E/F dated **31 August 2002**. Aerojet shall submit a schedule for submittal of an Operation, Maintenance, and Monitoring Plan for the western OU-3 GET facilities no later than **30 April 2004** for Executive Officer approval. The Discharger shall comply with the approved version of the plan and any approved revisions thereto.
3. Prior to discharge to Alder Creek of the Nimbus Dam Stilling Basin, or adding the OU-3 Areas 1 and 3 discharges to Buffalo Creek, the Dischargers shall complete and submit an assessment of the thermal impacts to the receiving water from the discharge and verify that the discharge will not cause a violation of receiving water limitation D.9. The discharge to the new discharge location cannot commence until approved by the Executive Officer.
4. The Discharger shall conduct the chronic toxicity testing specified in the Monitoring and Reporting Program. If the testing indicates that the discharge causes, has the reasonable potential to cause, or contributes to an in-stream excursion above the water quality objective for toxicity, the Discharger shall submit a work plan to conduct a Toxicity Reduction Evaluation (TRE) and upon approval conduct the TRE, and this Order will be reopened and a chronic toxicity limitation included and/or a limitation for the specific toxicant identified in the TRE included. Additionally, if the State Water Resources Control Board adopts a chronic toxicity water quality objective, this Order may be reopened and a limitation based on that objective included.
5. The Discharger shall use the best practicable cost-effective control technique currently available to limit mineralization to no more than a reasonable increment.
6. The Discharger shall comply with all the items of the "Standard Provisions and Reporting Requirements for Waste Discharge Requirements (NPDES)", dated 1 March 1991, which are part of this Order. This attachment and its individual paragraphs are referred to as "Standard Provision(s)."
7. The Discharger shall comply with the attached Monitoring and Reporting Program No. R5-2004-0027, which is part of this Order, and any revisions thereto, as ordered by the Executive Officer.
8. Under Monitoring and Reporting Program No. R5-2004-0027, the Discharger shall report trace concentrations of constituents found during the analysis of samples. Trace values are estimates of concentrations detected between the detection level and the practical quantitation level. Trace values are not always reliable as there is a potential for interferences below the practical quantitation level. As effluent limitations specified in this permit are at or above the practical

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quantitation level, reporting trace values shall not be a violation of an effluent limitation. Trace values are to be used to help operate the treatment facility and to provide information to minimize violations of effluent limits.”

9. Section 13267(b) of the California Water Code provides that: “In conducting an investigation specified in subdivision (a), the regional board may require that any person who has discharged, discharges, or is suspected of discharging, or who proposes to discharge within its region, or any citizen or domiciliary, or political agency or entity of this state who has discharged, discharges, or is suspected of discharging, or who proposes to discharge waste outside of its region that could affect the quality of the waters of the state within its region shall furnish, under penalty of perjury, technical or monitoring program reports which the board requires. The burden, including costs of these reports, shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports.” The monitoring and reporting program and technical reports required by this Order and the attached “Monitoring and Reporting Program, Order No. R5-2004-0027” are necessary to assure compliance with these waste discharge requirements. The Discharger operates the facility that discharges the waste subject to this Order.
10. By **1 April 2004** the Discharger shall submit a time schedule for planning, developing, and submitting a technical report that assesses the cumulative impacts on the groundwater basin caused by the withdrawal and export of the groundwater from the GET systems that discharge to surface water under this permit and that evaluates alternatives for addressing significant impacts identified, if any. The Discharger shall submit the report by **1 July 2004**. The Discharger should prepare its report in coordination with the Water Forum, the local water purveyors including, but not necessarily limited to California-American Water Company and Southern California Water Company, and other responsible parties, other than Aerojet, extracting groundwater to remediate groundwater pollution. The Discharger shall proceed with the preparation of the report in accordance with the schedule upon approval of the Executive Officer.
11. If perchlorate associated with the discharge is found in the American River exceeding 4.0 µg/l, or the current Department of Health Services Action Level or state drinking water standards (i.e., Maximum Contaminant Levels), then the Discharger shall cease the discharge and the permit shall be reopened to make appropriate modifications to the permit and to the discharge.
12. **Within 24-hours** after the Discharger has received information that its discharge exceeds effluent limitations, the Discharger shall notify the Board, City of Sacramento Department of Utilities, and Carmichael Water District. Arden-Cordova Water Service shall be notified if the discharge that is in violation is to Lake Natoma.
13. This Order expires on **1 March 2009** and the Discharger must file a Report of Waste Discharge in accordance with Title 23, CCR, not later than 180 days in advance of such date in application for renewal of waste discharge requirements if it wishes to continue the discharge.

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14. Prior to making any change in the discharge point, place of use, or purpose of use of the wastewater, the Discharger shall obtain approval of or clearance from the State Water Resources Control Board (Division of Water Rights).
15. In the event of any change in control or ownership of land or waste discharge facilities presently owned or controlled by the Discharger, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office.
16. To assume operation under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the State of incorporation if a corporation, the name, address, and telephone number of the persons responsible for contact with the Board, and a statement. The statement shall comply with the signatory paragraph of Standard Provision D.6 and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge without requirements, a violation of the California Water Code. Transfer shall be approved or disapproved in writing by the Executive Officer.

I, THOMAS R. PINKOS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 19 March 2004.

THOMAS R. PINKOS, Executive Officer

Revised 02/23/04:AMM

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

MONITORING AND REPORTING PROGRAM

NPDES NO. CA0083861

ORDER NO. R5-2004-0027

FOR
AEROJET-GENERAL CORPORATION
INTERIM GROUNDWATER EXTRACTION AND TREATMENT SYSTEMS
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Specific sample station locations have been established under direction of the Regional Board's staff, and a description of the stations is attached to this Order.

GROUNDWATER TREATMENT SYSTEM MONITORING

Samples shall be collected from the inlet and outlet to the treatment system and analyzed. If the discharge is intermittent rather than continuous, then the samples shall be collected on the first day of the intermittent discharge. The time of collection of samples shall be recorded. The treatment system monitoring shall include at least the following:

American River Study Area Treatment Facility

Constituents	Units	Type of Sample	Sampling Frequency
Flow ¹	mgd	Grab	Continuous
Acute Toxicity ^{2,3}		Grab	Quarterly
Total Dissolved Solids ³	mg/L	Grab	Monthly
Dissolved Oxygen ^{1,3}	mg/L	Grab	Monthly
Volatile Organics ⁴	µg/L	Grab	Monthly ¹⁴
Semi-Volatile Organics ⁵	µg/L	Grab	Monthly ¹⁴
1,4-dioxane ⁶	µg/L	Grab	Monthly
pH ¹	Number	Grab	Monthly
Turbidity	NTU	Grab	Monthly
Temperature ¹	°F (°C)	Grab	Monthly
Electrical Conductivity@25°C ^{1,3}	µmhos/cm	Grab	Monthly
Total Copper	mg/L	Grab	Quarterly
Total Lead	mg/L	Grab	Quarterly

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Constituents	Units	Type of Sample	Sampling Frequency
Total Zinc	mg/L	Grab	Quarterly
Perchlorate ²	µg/L	Grab	Monthly ¹⁴
N-Nitrosodimethylamine ⁸	µg/L	Grab	Monthly ¹⁴
Hardness as (as CaCO ₃)	mg/L	Grab	Monthly

Footnotes as provided below

GET E/F

Constituents	Units	Type of Sample	Sampling Frequency
Electrical Conductivity@25°C ^{1,3}	µmhos/cm	Meter	Monthly
Flow ¹	mgd	Grab	Continuous
Total Dissolved Solids	mg/L	Grab	Monthly
Acute Toxicity ^{2,3}		Grab	Monthly
Dissolved Oxygen ^{1,3}	mg/L	Grab	Monthly
Volatile Organics ⁴	µg/L	Grab	Monthly ¹⁴
Semi-Volatile Organics ⁵	µg/L	Grab	Monthly ¹⁴
1,4-dioxane ⁶	µg/L	Grab	Monthly
pH ¹	Number	Grab	Monthly
Turbidity	NTU	Grab	Monthly
Temperature ¹	°F (°C)	Grab	Weekly
Total Copper	mg/L	Grab	Quarterly
Total Lead	mg/L	Grab	Quarterly
Total Zinc	mg/L	Grab	Quarterly
Perchlorate ²	µg/L	Grab	Monthly ¹⁴
N-Nitrosodimethylamine ⁸	µg/L	Grab	Monthly ¹⁴
Hardness as (as CaCO ₃)	mg/L	Grab	Monthly
PROWL ⁹	µg/L	Grab	Twice per year
Formaldehyde ¹⁰	µg/L	Grab	Monthly
Acetaldehyde ¹¹	µg/L	Grab	Monthly

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Constituents	Units	Type of Sample	Sampling Frequency
Gloxayl ¹²	µg/L	Grab	Monthly
Ethanol ¹³	µg/L	Grab	Monthly
Iron, Total and Dissolved	µg/L	Grab	Monthly

Footnotes as provided below

Western OU-3 Facilities (Areas 1, 2, and 3)

Constituents	Units	Type of Sample	Sampling Frequency
Electrical Conductivity@25°C ^{1,3}	µmhos/cm	Meter	Monthly
Flow ¹	mgd	Grab	Continuous
Total Dissolved Solids	mg/L	Grab	Monthly
Acute Toxicity ^{2,3}		Grab	Monthly
Dissolved Oxygen ^{1,3}	mg/L	Grab	Monthly
Volatile Organics ⁴	µg/L	Grab	Monthly ¹⁴
Semi-Volatile Organics ⁵	µg/L	Grab	Monthly ¹⁴
1,4-dioxane ⁶	µg/L	Grab	Monthly
pH ¹	Number	Grab	Monthly
Turbidity	NTU	Grab	Monthly
Temperature ¹	°F (°C)	Grab	Weekly
Total Copper	mg/L	Grab	Quarterly
Total Lead	mg/L	Grab	Quarterly
Total Zinc	mg/L	Grab	Quarterly
Perchlorate ²	µg/L	Grab	Monthly ¹⁴
N-Nitrosodimethylamine ⁸	µg/L	Grab	Monthly ¹⁴
Hardness as (as CaCO ₃)	mg/L	Grab	Monthly
Formaldehyde ^{10,15}	µg/L	Grab	Monthly
Acetaldehyde ^{11,15}	µg/L	Grab	Monthly
Gloxayl ^{12,15}	µg/L	Grab	Monthly
Ethanol ^{13,15}	µg/L	Grab	Monthly

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- 1 Field Measurements.
- 2 The analyses shall be performed in accordance with EPA/600/4-90/027, *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*.
- 3 Sampling of Effluent only.
- 4 Test method to be by EPA Methods 601 and 602, or 8010 and 8020, or 8260, or 500, or an equivalent method, series with a practical quantitation level no greater than 0.5 µg/l. All concentrations between the detection level and practical quantitation level shall be reported as trace.
- 5 Test method to be EPA Method 8270 or equivalent. All peaks shall be reported and tentatively identified. All concentrations between the detection limit and the practical quantitation limit shall be reported as trace values.
- 6 A practical quantitation level of 10 µg/l. All concentrations between the detection level and quantitation level shall be reported as trace.
- 7 A practical quantitation level of 4 µg/l. All concentrations between the detection level and quantitation level shall be reported as trace.
- 8 NDMA analysis with a practical quantitation level no greater than 0.005 µg/l. All concentrations between the detection level and quantitation level shall be reported as trace.
- 9 PROWL analysis with a practical quantitation level no greater than 10 µg/l. All concentrations between the detection level and quantitation level shall be reported as trace.
- 10 Formaldehyde analysis with a practical quantitation level no greater than 5 µg/l. All concentrations between the detection level and quantitation level shall be reported as trace.
- 11 Acetaldehyde analysis with a practical quantitation level no greater than 1 µg/l. All concentrations between the detection level and quantitation level shall be reported as trace.
- 12 Glyoxal analysis with a practical quantitation level no greater than 5 µg/l. All concentrations between the detection level and quantitation level shall be reported as trace.
- 13 Ethanol analysis with a practical quantitation level no greater than 10 µg/l. All concentrations between the detection level and quantitation level shall be reported as trace.
- 14 If the United States Bureau of Reclamation projected flows in the American River fall below 1500, then the sampling shall be weekly for that period. Aerojet shall supply the projections with the monthly Monitoring Report to justify the sampling conducted.
- 15 Only if biological treatment system is used.

Note: All metals analyses shall be by atomic adsorption methods or a method with an equivalent practical quantitation limit, or a method achieving equivalent or lower practical quantitation levels. In addition, chronic toxicity monitoring for the treatment system is also required, and detailed below.

RECEIVING WATER MONITORING

All receiving water samples shall be grab samples. Receiving water monitoring shall include at least the following (locations may be modified, and will be finalized following verification in the field by Regional Board staff):

<u>Station</u>	<u>Description</u>
R-1	At least 100 feet upstream on the American River from the confluence with Buffalo Creek.
R-2	Downstream on the American River at the pedestrian bridge crossing just downstream of the Sunrise Bridge overcrossing.
R-3	If discharge is occurring to Alder Creek, the sample shall be collected at least 100 feet upstream of the discharge into Alder Creek.
R-4	If discharge to Alder Creek is occurring, then the sample shall be collected approximately 100 feet downstream in Alder Creek.

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- R-5 At least 100 feet upstream, if possible, on Morrison Creek from the confluence with drainage ditch discharge from Area 1.
- R-6 At least 50-feet downstream on Morrison Creek from the confluence with the drainage ditch discharge from Area 1
- R-7 At least 100 feet upstream on the American River from the discharge point carrying flow from the Area 3 treatment system.
- R-8 At least 100 feet downstream on the American River from the discharge point carrying flow from the Area 3 treatment system.
- R-9 At least 100 feet upstream on the American River from the discharge point of the Boyd Station Channel (If Area 1 discharge is to Boyd Station Channel)
- R-10 At least 100 feet downstream on the American River from the discharge point of the Boyd Station Channel (If Area 1 discharge is to the Boyd Station Channel)

Constituents	Units	Station	Sampling Frequency
Dissolved Oxygen ⁶	mg/L	R-1 through R-10	Monthly
Electrical Conductivity@25°C ⁶	µmhos/cm	R-1 through R-10	Monthly
Total Dissolved Solids	mg/L	R-1 through R-10	Monthly
Volatile Organics ¹	µg/L	R-1 through R-10	Monthly
Semi-Volatile Organics ²	µg/L	R-1 through R-10	Monthly
pH ⁶	Number	R-1 through R-10	Monthly
Turbidity	NTU	R-1 through R-10	Monthly
Temperature ⁶	°F (°C)	R-1 through R-10	Monthly
Total Copper	mg/L	R-1 through R-10	Quarterly
Total Lead	mg/L	R-1 through R-10	Quarterly
Total Zinc	mg/L	R-1 through R-10	Quarterly
Perchlorate ³	µg/L	R-1 through R-10	Monthly
N-Nitrosodimethylamine ⁴	µg/L	R-1, R-2, R-3, R-4, R-7, R-8	Monthly
Hardness as (as CaCO ₃)	mg/L	R-1 through R-10	Monthly
Ethanol ⁵	µg/L	R-1, R-2, R-3, R-4	Monthly
1,4-dioxane	µg/L	R-1, R-2, R-3, R-4	Monthly

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Constituents	Units	Station	Sampling Frequency
Iron, Total and Dissolved	µg/L	R-1, R-2, R-3, R-4	Monthly

- ¹ Test method to be by EPA Methods 601 and 602, or 8010 and 8020, or 8260, 500 series, or an equivalent method, with a practical quantitation level no greater than 0.5 µg/l. All concentrations between the detection level and practical quantitation level shall be reported as trace.
- ² Test method to be EPA Method 8270 or equivalent. All peaks shall be reported and tentatively identified. All concentrations between the detection limit and the practical quantitation limit shall be reported as trace values.
- ³ A practical quantitation level of 4 µg/l. All concentrations between the detection level and quantitation level shall be reported as trace.
- ⁴ NDMA analysis with a practical quantitation level no greater than 0.005 µg/l. All concentrations between the detection level and quantitation level shall be reported as trace.
- ⁵ Ethanol analysis with a practical quantitation level no greater than 10 µg/l. All concentrations between the detection level and quantitation level shall be reported as trace.
- ⁶ Field Measurements.

Note: All metals analyses shall be by atomic adsorption methods or a method with an equivalent practical quantitation limit, or a method achieving equivalent or lower practical quantitation levels.

In conducting the receiving water sampling, a log shall be kept of the receiving water conditions in the American River. Notes on receiving water conditions shall be summarized in the monitoring report. Attention shall be given to the presence or absence of:

- | | |
|---------------------------------|--|
| a. Floating or suspended matter | e. Visible films, sheens or coatings |
| b. Discoloration | f. Fungi, slimes, or objectionable growths |
| c. Bottom deposits | g. Potential nuisance conditions |
| d. Aquatic life | |

THREE SPECIES CHRONIC TOXICITY MONITORING

Chronic toxicity monitoring shall be conducted to determine whether the effluent is contributing to toxicity in the Lower American River. The testing shall be conducted as specified in EPA 600/4-89-001. Chronic toxicity samples shall be collected at the discharge of the Ground Water Treatment Plant prior to entering the receiving water (Buffalo, Alder Creek, or the Nimbus Stilling Basin), or the drainage courses to Morrison Creek and/or the American River. One additional test shall be performed on samples collected from Buffalo Creek just prior to leaving the Discharger's property. Samples collected from the outlet of the treatment unit shall be representative of the volume and quality of the discharge. The time of collection for samples shall be recorded. Chronic toxicity monitoring shall include the following:

Species: *Pimephales promelas*, *Ceriodaphnia dubia*, *Selenastrum capriocornutum*

Frequency: Once per quarter for first year, annually thereafter

Dilution Series: 100 percent effluent

Based on the results of the monitoring, the Board staff may require modification to the frequency and species used for the toxicity testing.

MONITORING OF DISCHARGE TO SAILOR BAR PARK

The Discharger shall sample the discharge to pond in Sailor Bar Park for volatile organic constituents and perchlorate as listed above in the table for the American River Study Area groundwater treatment system monitoring when system is operating. The sample shall be collected and analyzed on a monthly basis, when the well is operating, from the discharge prior to it entering the pond.

REPORTING

Monitoring results shall be submitted to the Regional Board by the **25th day of the month** following sample collection. Quarterly and annual monitoring results shall be submitted by the **25th day of the month** following each calendar quarter and year, respectively.

In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly whether the discharge complies with waste discharge requirements.

If the Discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, the results of such monitoring shall be included in the calculation and reporting of the values required in the discharge monitoring report form. Such increased frequency shall be indicated on the discharge monitoring report form.

By **30 January of each year**, the Discharger shall submit a written report to the Executive Officer containing the following:

- a. The names and telephone numbers of persons to contact regarding the plant for emergency and routine situations.
- b. A statement certifying when the flow meter and other monitoring instruments and devices were last calibrated, including identification of who performed the calibration (Standard Provision C.6).

The Discharger may also be requested to submit an annual report to the Regional Board with both tabular and graphical summaries of the monitoring data obtained during the previous year. Any such request shall be made in writing. The report shall discuss the compliance record. If violations have occurred, the report shall also discuss the corrective actions taken and planned to bring the discharge into full compliance with the waste discharge requirements.

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All reports submitted in response to this Order shall comply with the signatory requirements of Standard Provision D.6.

The Discharger shall implement the above monitoring program on the first day of the month following effective date of this Order.

Ordered by: _____
THOMAS R. PINKOS, Executive Officer

19 March 2004
(Date)

AMM (2/23/04)

Aerojet-General Corporation (Aerojet) operates a rocket-testing and chemical manufacturing facility in eastern Sacramento County near Rancho Cordova and Folsom. Past discharges and disposal practices have caused the release of volatile and semi-volatile organic contaminants to groundwater and the vadose zone. One of the contaminated groundwater plumes extends northwest from Aerojet's property underneath the American River, Sailor Bar Park, and beneath the community of Fair Oaks. This area is referred to as the American River Study Area (ARSA). Aerojet has been discharging extracted groundwater from ARSA under an NPDES permit since 1996. Aerojet requested to add an additional discharge from another groundwater extraction and treatment systems, GET E/F, which captures contaminated groundwater in the western portion of the Aerojet facility. The permit for the ARSA was revised in July 2002 to include the discharge from GET E/F. Subsequently, Aerojet has requested to add additional discharges from off-site interim groundwater treatment systems in the Western Ground Water Operable Unit, also known as Operable Unit 3 (OU-3). The permit is being revised to include those discharges.

American River Study Area

The concentrations of volatile organic contaminants (VOCs) in the groundwater in the ARSA include up to 4000 micrograms per liter ($\mu\text{g/L}$) trichloroethylene (MCL of 5 $\mu\text{g/L}$), 220 $\mu\text{g/L}$ cis- 1,2-dichloroethylene (MCL of 6.0 $\mu\text{g/L}$), 110 $\mu\text{g/L}$ 1,1-dichloroethylene (MCL of 5.0 $\mu\text{g/L}$), and 36 $\mu\text{g/L}$ tetrachloroethylene (MCL of 5.0 $\mu\text{g/L}$). Other maximum concentrations of non-volatile contaminants of concern detected in the groundwater are 1,4 dioxane at 29 $\mu\text{g/L}$ and perchlorate at up to 150 $\mu\text{g/L}$. More discussion on these contaminants is found below.

The Regional Board adopted Cleanup and Abatement Order No. 95-715 requiring Aerojet to provide interim measures to minimize the flux of groundwater contaminants in the plumes described above while assessing the appropriate means of remediating the plume of contaminated groundwater in the American River Study Area. That interim measure consisted of extracting groundwater from three groundwater extraction wells at the toe of the plume, treating the extracted groundwater using activated carbon in a temporary treatment facility, and discharging the treated water to a pond in Sailor Bar Park. This park is located on the north side of the American River. The discharge was regulated by an NPDES permit, Order No. 96-066. The operation of the plant during its 1.5 years of operation was in substantial compliance with the requirements found in Order No. 96-066.

The Board modified Order No. 95-715 with the adoption of Order No. 96-230, directing Aerojet to complete the design, construction, and operation of a groundwater extraction and treatment system in the American River Study Area to contain and cleanup the plume of contaminated groundwater. Aerojet is complying with that Order by completing construction of a treatment system on Aerojet's property capable of treating a flow of 3500 gpm. Aerojet completed the extraction wells and treatment system and commenced discharge from the treatment system to Buffalo Creek in 1998. Extracted groundwater comes from nine wells in Sailor Bar Park and six wells on the south side of the American River. Additional extraction wells are being constructed to enhance plume containment. The treated effluent is discharged to Buffalo Creek, a tributary of the American River just east of the Sunrise Bridge overcrossing. In addition, the Sacramento County Department of Parks and Recreation requested Aerojet continue the discharge to the pond in Sailor Bar Park that was discontinued with the shutdown of the temporary facility. The water supply well that has been utilized in the past by County Parks for the purpose of maintaining the water level in the pond contains up to 120 $\mu\text{g/L}$ trichloroethylene and requires treatment before discharge to the pond. Aerojet provides treatment on that well using activated carbon, removing the VOCs to below detection levels (0.5 $\mu\text{g/L}$).

GET E/F

Aerojet has been operating the groundwater extraction systems, GET E and F, since 1984, and according to the requirements of the Partial Consent Decree since its entry by Federal Court in December 1989. Effluent from the GET E and F facilities was either discharged to land or recharged to groundwater via injection wells. GET E and GET F were combined in 2000 with all of the water being treated at a modified GET E/F facility. The GET E/F extraction system is designed to intercept groundwater contaminant plumes prior to them leaving the western portion of the Discharger's property. The facility operates at approximately 5200 gpm, with a treatment capacity of 6000 gpm. The GET E/F facilities are part of the remedy for OU-3 section of Aerojet. The Record of Decision for OU-3 issued by USEPA in July 2000 does not call for injection, but for discharge of the treated groundwater to surface water in order to allow for the greatest potential for reuse of the treated groundwater to provide replacement water supplies for those lost due to contamination in the Rancho Cordova and surrounding areas. In addition, infiltration capacity in the vicinity is limited as demonstrated by the current ponding of water from the GET E/F discharge of 3600 gpm to land for recharge. Increasing application to land at a rate of 6000 gpm is not feasible.

The groundwater contaminant plumes intercepted by the GET E/F extraction field include VOCs (primarily TCE), perchlorate, and NDMA. The GET E/F facility uses biological reduction to remove perchlorate, ultraviolet light to destroy NDMA, and air stripping to remove VOCs. The GET E/F facility has been operating in its current configuration since 2000. The treatment process has been shown to be effective in removing VOCs to below detection levels (0.5 µg/l), perchlorate to below 4 µg/l, and NDMA to below detection (0.002 –0.0075 µg/l). Testing of the influent and effluent to the treatment facility for full-scan analysis, including tentatively identified compound analysis, did not indicate additional contaminants of concern.

Initial discharge of the treated groundwater has been to Buffalo Creek. Later, the effluent from the GET E/F facility may also be discharged to Alder Creek, tributary to Lake Natoma (American River), on Aerojet's property. A pipeline to convey the treated water from the GET E/F facility will need to be constructed prior to the discharge to Alder Creek. The interim discharge to Buffalo Creek will co-mingle with the discharge from the ARSA facility, prior to leaving the Discharger's property.

OU-3 Off-site GETs (Areas 1, 2, and 3)

The other part of the remedy for OU-3 deals with the groundwater pollution off of Aerojet's property in the western portion of OU-3. Aerojet has proposed an interim solution calling for extracting and treating the polluted groundwater at three locations in OU-3 (Areas 1, 2, and 3). The interim solution will likely become the basis for the final western OU-3 remedy. The three extraction and treatment systems will intercept groundwater containing primarily TCE, perchlorate, NDMA, with some trace concentrations of other VOCs.

The treatment systems will consist of granular activated carbon and/or UV-oxidation to remove TCE and other VOCs, UV destruction of NDMA, and ion exchange and/or biological reduction for perchlorate. These treatment processes have been demonstrated to remove the pollutants to at or below the specified effluent limitations. Initially, the treatment systems will use ion exchange for removal of perchlorate. If increasing concentrations of perchlorate make biological reduction more cost-effective than ion exchange for removal of perchlorate, Aerojet may choose to switch treatment processes.

Initial estimates for flows that will be produced by the three extraction and treatment systems are 1,500 gpm, 3,100 gpm, and 400 gpm for Areas 1, 2, and 3, respectively. The discharge flow from the Area 1 GET will be initially discharged to the storm drainage system that leads to Morrison Creek. Once the long-term GET for Area 1 is completed, the flow will be to the storm drainage system leading to the Lower American River. The Area 2 GET will discharge to the Buffalo Creek drainage system. The Area 3 GET will discharge to the storm drain system leading to the Lower American River.

Reasonable Potential and Anti-degradation Analyses

A reasonable potential analyses for priority pollutants, utilizing guidance covered by the Policy for the Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP), adopted in March 2000 by the State Board, was conducted based upon data submitted by the Discharger regarding effluent concentrations of volatile organic compounds.

The numeric water quality criteria for priority pollutants were promulgated by U.S. EPA with the adoption of the *National Toxics Rule* on 5 February 1993 and the *California Toxics Rule* on 18 May 2000. The reasonable potential analysis for Trichloroethene, 1,2-Dichloroethane, Chloroform, cis-1, 2-Dichloroethene, revealed that these constituents may exceed numeric water quality criteria, and require limits. Limits were not included for those detected constituents where there is no reasonable potential to exceed a standard.

Additionally, federal regulations require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have a reasonable potential to cause, or contribute to an in-stream excursion above numerical or narrative water quality standard. The Discharger is required to provide information as to whether the levels of priority pollutants, including CTR and NTR constituents, and constituents for which drinking water maximum contaminant levels prescribed in the California Code of Regulations, in the discharge cause or contribute to an in stream excursion above a water quality objective. If the discharge has the reasonable potential to cause or contribute to an in-stream excursion above a water quality objective, the Discharger is required to submit information to calculate effluent limitations for those constituents.

Effluent Limits

The following water quality limits have been selected to implement all applicable water quality objectives for the protection of Board-designated beneficial uses of surface water in the American River and Morrison Creek downstream of the discharge point(s):

Volatile Organic Compounds

Both the ARSA and GET E/F treatment facilities utilize air stripping and ultraviolet/peroxide oxidation to remove the volatile organics from the extracted groundwater to concentrations less than the quantitation limit of 0.5 µg/l (the effluent limitation for these constituents). The 0.5 µg/l value for the volatile organic constituents are below the respective maximum contaminant levels (Primary and Secondary Drinking Water Standards) for the individual volatile organic contaminants. One chemical of concern, 1,2-Dichloroethane has a CTR value less than 0.5 µg/l and so its monthly average is set at that concentration. The effluent limits are based on Best

Available Technology utilizing either air stripping or carbon adsorption which have been demonstrated to readily reduce volatile organics to below 0.5 µg/l.

1,4-Dioxane Limitation

The treatment systems at ARSA and GET E/F utilize ultraviolet light/peroxide which has been demonstrated to effectively destroy 1,4-dioxane. The calculated concentrations of 1,4-dioxane entering and exiting the ARSA treatment plant are 6 µg/l and 3 µg/l, respectively. These are below the practical quantitation level of 10 µg/l and the Proposition 65 value of 15 µg/l. Sampling of the effluent from the facility has not shown detectable concentrations of 1,4-dioxane. The effluent limitations have been set at the practical quantitation level for the monthly average value and the Proposition 65 value for the daily maximum. It should also be noted that there will be a minimum 30-fold dilution in the American River (flow at 250 cubic feet per second) at the maximum discharge rate of 3450 gpm.

Only very low concentrations (3 to 5 µg/l) of 1,4-dioxane have been detected in the influent to the GET E/F facility. The facility has been shown to effectively remove these low concentrations to below 3 µg/l. The groundwater in western OU-3 to be captured by the Areas 1, 2, and 3 treatment system has not been found to contain 1,4-dioxane.

Perchlorate Limitation

The current Action Level (January 2002) set by the Department of Health Services -Office of Drinking Water as its recommended value not to be exceeded in a drinking water supply, is 4 µg/L. In March 2003, the California Office of Environmental Health Hazard Assessment released a draft Public Health Goal for perchlorate of 2 to 6 µg/L. For the ARSA facility, the calculated value that could eventually be found in the influent to the treatment plant is 8 µg/L (the current influent concentrations range between 5 and 7 µg/L). The previous version of this permit established the effluent limitation for perchlorate at 18 µg/L, the Action Level for perchlorate at the time of adoption of the permit. Given the minimum 30-fold dilution in the Lower American River, the low influent perchlorate concentration, and the additional mixing with the GET E/F effluent, this permit does not establish a revised effluent limitation for perchlorate.

The GET E/F influent concentration of perchlorate is approximately 3000 µg/l. The GET E/F treatment facility has been shown to be capable of reducing the perchlorate concentration to less than the practical quantitation level of 4 µg/l. The effluent limitation is established at 4 µg/L based on the ability to reduce the concentration to at or below the Action Level. For the new facilities (off-site Western Groundwater Operable Unit) Best Available Technology Limits are applied resulting in the effluent limitation of 4 µg/L.

NDMA Limitation

N-Nitrosodimethylamine (NDMA), a contaminant not suspected in the American River Study Area, but found in the groundwater at the eastern end of Aerojet and in March 1998 in wells at the western end of Aerojet, is required to be sampled and analyzed for in the permitted discharges and receiving water. To date, no NDMA has been found within the extraction area for ARSA. There are no known source areas for NDMA in the vicinity or upgradient of the American River Study Area. Additional sampling of groundwater monitor wells in the American River Study Area for NDMA will occur on a periodic basis.

The GET E/F and the OU-3 treatment systems are designed to remove NDMA to concentrations no greater than 0.002 µg/L, the estimated excess one-in-a-million cancer risk value established by the Office of Environmental Health Hazard Assessment. The monthly average effluent limitation is established at 0.002 µg/L. However, the current PQL is 0.005 µg/L, with a detection limit of 0.001 µg/L. Concentrations that do not exceed the approved PQL are deemed in compliance with the effluent limitation. Trace concentrations will be reported.

Other

Analysis for metals in samples collected from the groundwater monitoring system and extraction wells and influent to the treatment system were used to assess which metals may be of concern. This analysis found only three metals of concern that were detected, or are currently of potential concern in the Lower American River. Those metals are copper, lead, and zinc. The effluent limitations for those metals are established based on protection of aquatic life, with no dilution. The values utilize a hardness of 100 mg/L and Ambient Water Quality Criteria, which is based on data collected from the groundwater and treatment systems. The detected values in the groundwater for those three metals are below the effluent limitations established in this permit.

The following tables provide the rationale for the effluent limits.

Table 1: Monthly Average Limit

Constituent	Monthly Average Limit	Units	Reference
Trichloroethene ¹	0.5	µg/L	Non-detect, Best Practicable Treatment
1,2-Dichloroethane ¹	0.38	µg/L	California Toxics Rule
Chloroform ¹	0.5	µg/L	Non-detect, Best Practicable Treatment
cis-1, 2-Dichloroethene ¹	0.5	µg/L	Non-detect, Best Practicable Treatment
Dichloromethane ¹	0.5	µg/L	Non-detect, Best Practicable Treatment
trans-1, 2-Dichloroethene ¹	0.5	µg/L	Non-detect, Best Practicable Treatment
1,4-Dioxane	3	µg/L	DHS Action Level
Perchlorate	4	µg/L	DHS Action Level, Best Practicable Treatment
N-nitrosodimethylamine	0.002	µg/L	Non-detect, Best Practicable Treatment

¹ – EPA Method 8260B or equivalent.

Discharge limits are primarily based on the *Fourth Edition of the Water Quality Control Plan (Basin Plan) for the California Regional Water Quality Control Board - Central Valley Region, Sacramento River and San Joaquin River Basins*, and Best Available Technology for removal of VOCs, NDMA, and perchlorate.

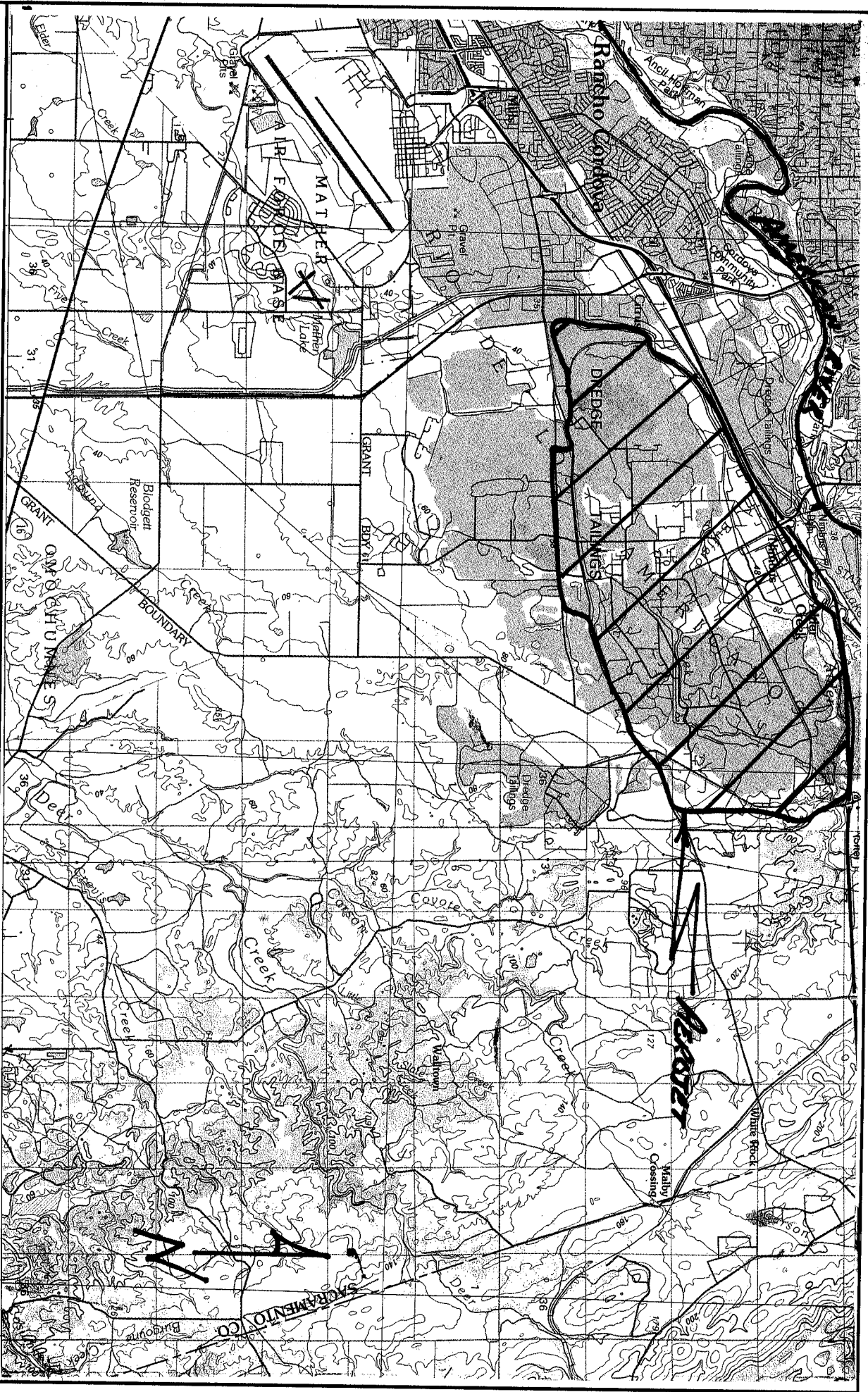
There have been three times in the last five years where the effluent from the ARSA facility slightly exceeded the daily maximum effluent limit for copper of 17 µg/L (18 to 21 µg/L). These excursions are slight, inconsistent, and rarely occur. In addition, the effluent from the ARSA facility mixes with the GET E/F discharge a very short distance down Buffalo Creek. The calculation of the flow-weighted average copper concentration in the combined flow is wells below both the daily maximum and monthly average effluent limitations.

Receiving Water Limitations

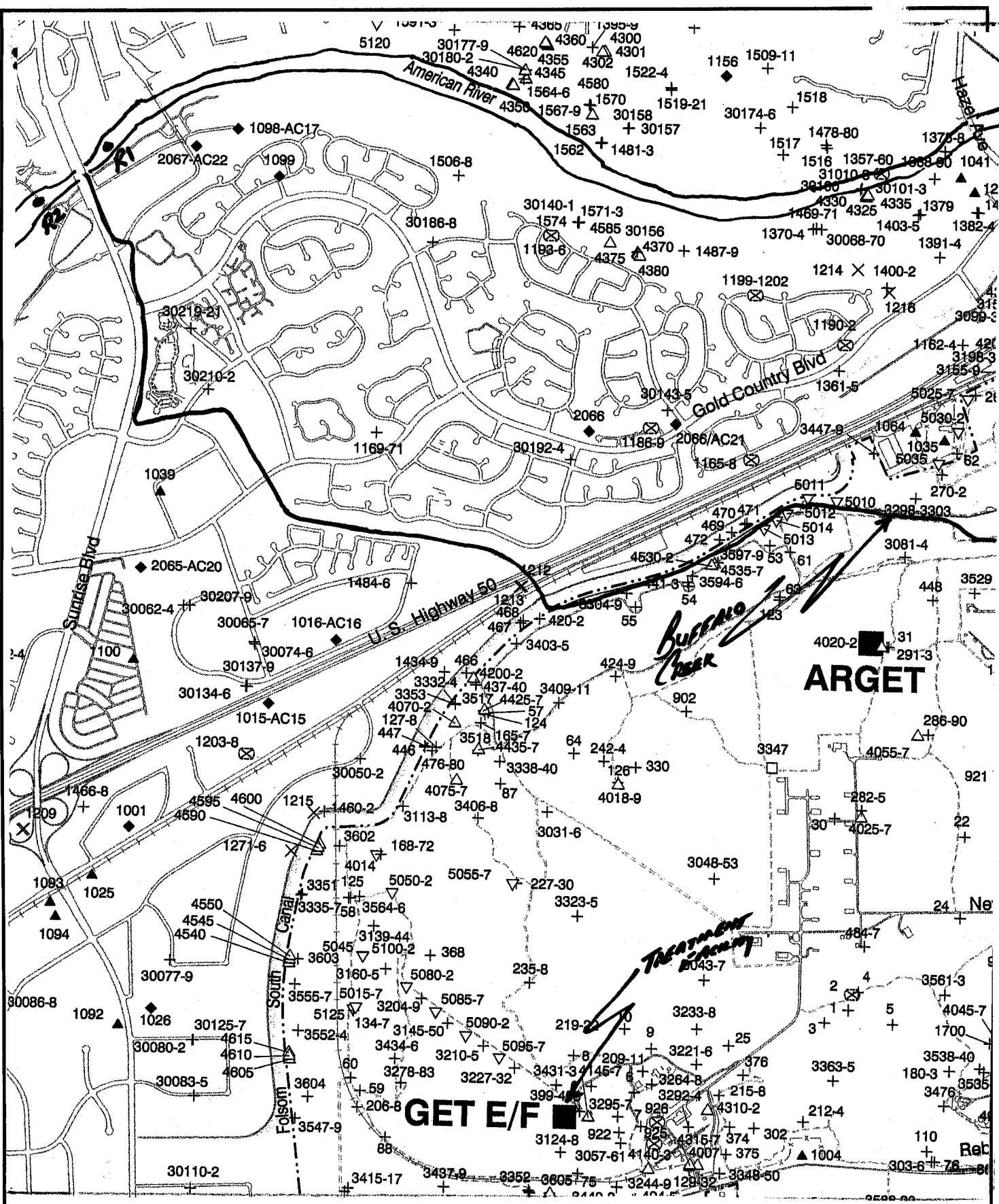
Receiving Water Limitations D.1 through D.13 are found in the Basin Plan and deal with general receiving water parameters. Given that this is not a discharge of elevated temperature wastewaters, limitations for temperature found in the *Water Quality Control Plan for Control of Temperatures in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* are not included.

Chronic and acute toxicity testing of the effluent is required.

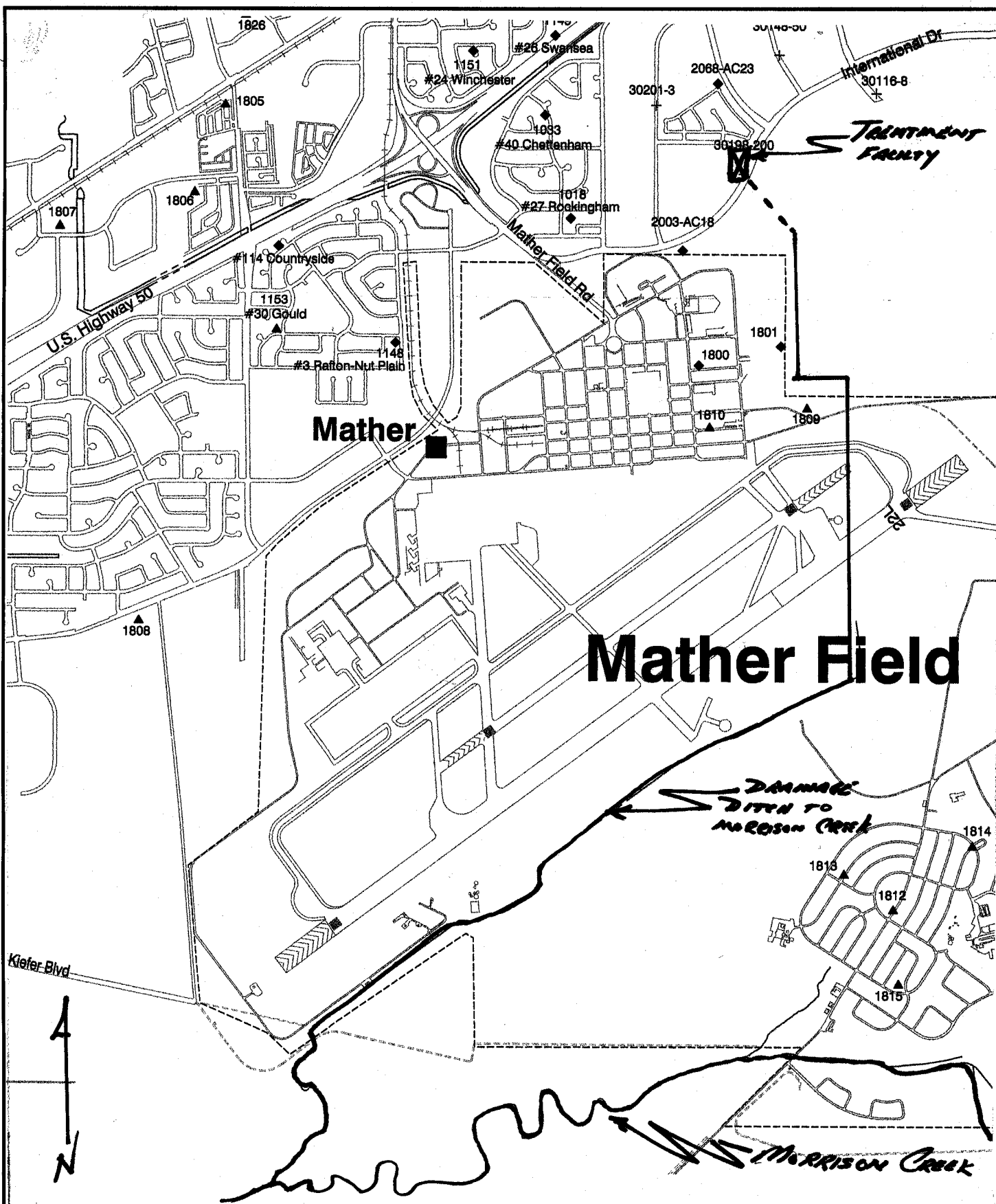
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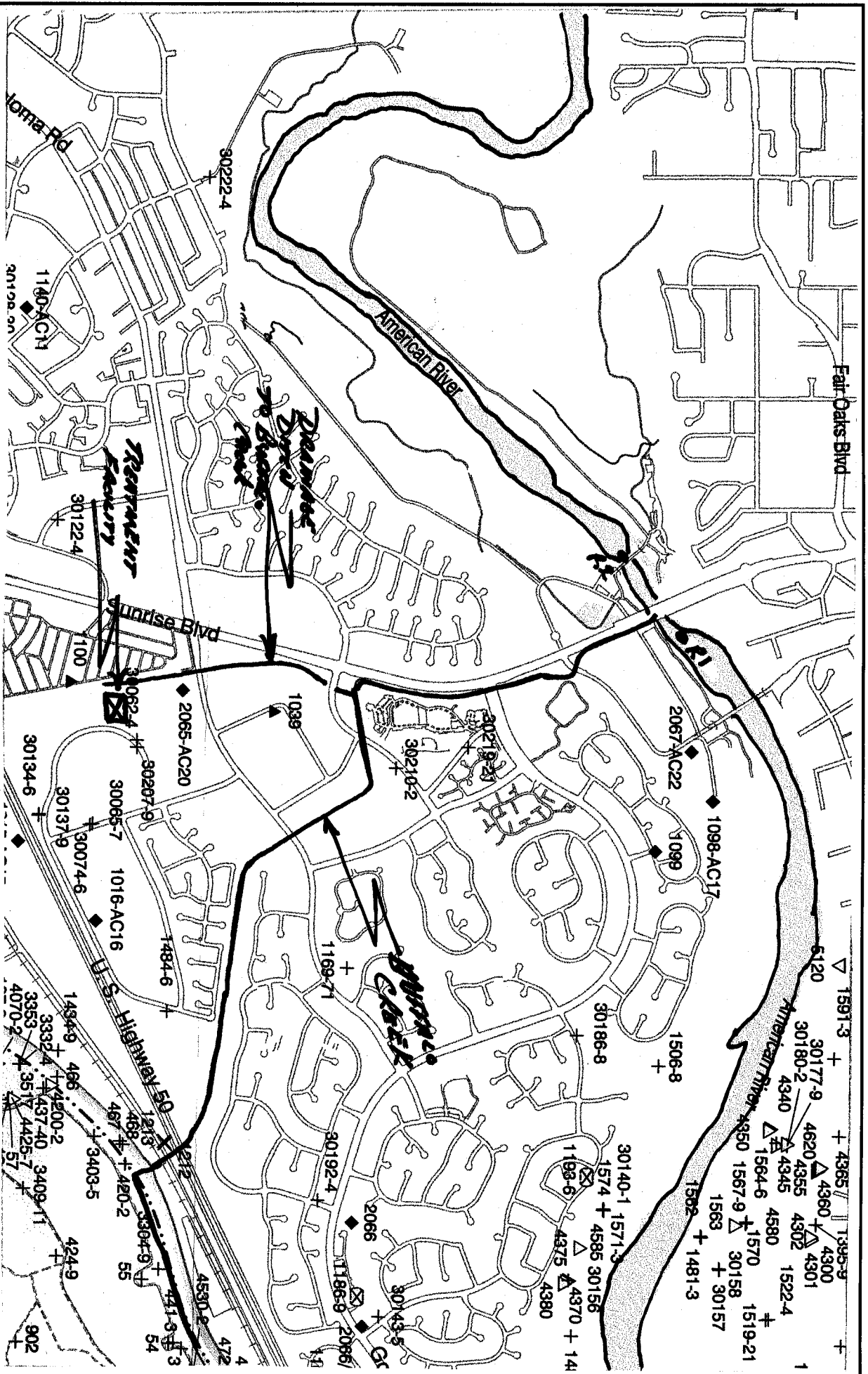
ATTACHMENT A
AEROJET-GENERAL CORPORATION
INTERIM GROUNDWATER EXTRACTION AND TREATMENT SYSTEMS
AMERICAN RIVER STUDY AREA, GET E/F, AND OU-3
SACRAMENTO COUNTY



Attachment C
 AEROJET-GENERAL CORPORATION
 Interim Groundwater Extraction and Treatment System
 GET E/F



Attachment D
AEROJET-GENERAL CORPORATION
Interim Groundwater Extraction and Treatment System
OU-3 AREA 1



ATTACHMENT E
 AEROJET-GENERAL CORPORATION
 INTERIM GROUNDWATER EXTRACTION AND TREATMENT SYSTEMS
 OU-3 AREA 2

